ENCLOSURE FOR

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Prof. Reuter awarded the defence industry's technology prize for 2007

Award made for "Humanitarian Mine-Clearing" project

Technologiepreis der wehrtechnischen Industrie 2007

In 2005, the 50th anniversary celebrations of the formation of the German Bundeswehr *[armed forces]* were the backdrop for the defence industry's technology prize being awarded for the first time by the Ausschuß der Verteidigungswirtschaft *[Defence Industry Committee – AVW]* of the Bundesverband der Deutschen Industrie *[Confederation of German Industry - BDI]*, with BDI President Jürgen Thumann presiding. This award, worth a total of € 20,000, was intended to reward outstanding innovative performance in safety/defence technology to promote Germany's internal and/or external security provision.

The 2007 award winners

The main prize was awarded for the second time on 29th November at the Haus der Deutschen Wirtschaft *[German Economics Centre]* in Berlin; it honoured the work of Prof. Matthias Reuter in the field of humanitarian

Land mines are a deadly danger, claiming some 25,000 lives every year

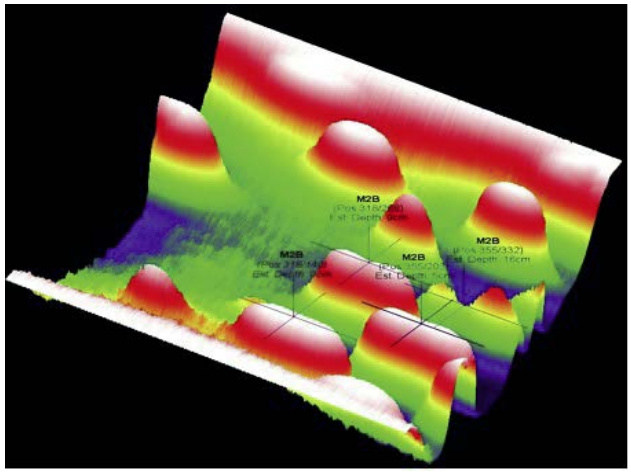
mine-clearing. The jury highlighted the innovative idea of using computer-aided, self-adapting methods for tracing land mines. A relic of armed struggles, these mines present a hazard to the populations of many countries of the world and are a barrier to rebuilding the infrastructure – reliable mine-clearing is absolutely essential.

Metal detectors are most frequently used to trace mines, but have the drawback of a high number of false alarms. Prof. Reuter and his team succeeded in reducing this number significantly using computational intelligence (CI) – and special neural networks as well – significantly increasing the reliability of mines being discovered.

As first field trials demonstrated, equipping commercial metal detectors with artificial intelligence (CI) modules also enables them to be set locally to suit the types of mine to be traced, expanding their use to previously unknown kinds of anti-personnel mine. This software also allows geological and weather-related anomalies of the soils being scanned to be extracted as irrelevant in the search for mines.

In another innovative step, CI can be used to assign mines to their actual positions and depths for the first time and to detect mine-like structures.

The classification and identification power a mine-seeker acquires in the field by these means can then also be transmitted to other mine-seeking equipment or to a central management point by mobile phone, for example, allowing an expanding expert system to be built up gradually.



Visualizing classification results with position and depth determination using the example of one type of mine and actual measured data

However, the process given this year's award can be applied to more than just mine-seeking; it can also be used for acoustic location and identification of helicopters and aircraft and for tracking down explosives.

The award-winning CI algorithms were developed in the course of the collaborative project entitled "Metalldetektoren für Humanitäres Minenräumen – Entwicklungspotenziale für Datenanalyse und Messtechnik: Teilprojekt Verbund-Koordination; modellbasierte Objekt-Klassifikation; Orts- und Lage-Bestimmung" *[Metal detectors for humanitarian mine-clearing – development potential for data analysis and measuring technology: sub-project: group coordination; model-based object classification; determining location and position]* funded by the BMBF *[Bundesministerium für Bildung und Forschung – Federal Ministry of Education and Research].*

Apl. Prof. Dr.-Ing. Matthias Reuter

After studying physics and geophysics, Prof. Reuter completed a doctorate in physical chemistry. Over the next few years, there followed appointments as a scientist at the Universität der Bundeswehr *[Armed Forces' University]* in Hamburg, the Technical University of Clausthal and the University of Dortmund, where his work in these exclusively research-based jobs focussed on neural networks and artificial cognitive systems. In pursuing these areas of special interest, Prof. Reuter wrote his professorial thesis on practical information technology and in 2006, was appointed apl. Professor *[adjunct professor]* at the Technical University of Clausthal. His scientific activities range from neural-based monitoring of vital parameters to robot football and predictive control of industrial plant. Prof. Reuter has run CUTEC's Modelling and Simulation department for five years and also chaired numerous international organizations for many years. He lectures at the Institut für Informatik *[Information Technology Institute]* at the Technical University of Clausthal and is a permanent adviser to Deutsche Bahn AG.